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ABSTRACT

This study examined the relationship between school scheduling format and average composite scores on the ACT Assessment after controlling for lifestyle factors, gender, school enrollment levels, number of examinees, and years under the scheduling model. The participants were 38,089 high schools seniors in 568 public high schools in Iowa and Illinois who completed the ACT Assessment in 1999. The focus was on data at the school level, and individual schools were represented by mean ACT composite scores for the school. The three scheduling models considered were: (1) traditional eight period (351 schools); (2) eight block alternating day (161 schools); and (3) 4x4 semester (56 schools). In general, findings show that the scheduling type used at a school does not predict the ACT composite scores when examined at the school level. Some of the limitations of the study are discussed. (Contains 4 tables and 36 references.) (SLD)

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Secondary School Scheduling Models:

How Do Types of Models Compare to the ACT Scores?

The school reform movement occurring over the past two decades has prompted educators to critically examine the influence of secondary school scheduling models on instructional practices and the corresponding effects on student achievement. This increased focus on school restructuring and reform stemmed, in part, from the 1983 publication of *A Nation at Risk* (National Commission on Excellence in Education, 1983). Noting that educational achievement declines in the United States were partially attributable to the manner in which the educational process was conducted, this commission recommended the more effective use of the traditional school day. In 1994 the National Education Commission on Time and Learning (NECTL) decried: "The degree to which today's American school is controlled by the dynamics of clock and calendar is surprising. . ." (p. 7). Recognizing that the school schedule governs how curriculum content is presented to students and, therefore, affects students' abilities to master it, the NECTL advocated for more flexible time scheduling and the creation of extended blocks of time for learning.

Constructivist theory, an emerging concept of teaching and learning, began to gain momentum alongside the reform movement in the late 1980s, further challenging the pedagogical wisdom of allocating such short timeframes for instruction. In contrast to behaviorist theory, which traditionally has focused on the instructor's role in the process of teaching, constructivism promotes the student's role in the learning process. Constructivist theory is based on the principles of actively engaging the learner in constructing meaning, permitting learners to interact with one another, application of knowledge through context-based problem-solving, and learner reflection throughout the process (Glatthorn, 1995). The

constructivist movement underscores the need for larger blocks of time to facilitate a learner-centered approach to instruction, which theoretically will lead to improved achievement (Elmore, 1995).

For decades the predominant high school scheduling format has consisted of uniform "periods," typically 6-8 each day, with each period 45-55 minutes in duration. In recognition of the growing consensus that this rigid daily-period scheduling design may be inadequate to facilitate new views of teaching and learning, many secondary school faculties have been experimenting with alternative scheduling approaches that extend learning time beyond the traditional 45-55 minute period. These approaches are commonly referenced as block-of-time scheduling, or the more generic term of "block scheduling."

Block Scheduling: Common Models

Block-of-time schedules commonly divide the instructional day into class sessions ranging between 80-110 minutes in length, with fewer courses meeting on a daily basis (Cawelti, 1994). Although numerous block-scheduling variations have been tested over the past decade, two approaches have clearly emerged as the most frequently utilized: the 4x4 semester plan and the eight-block alternating-day model. With the 4x4 semester approach, students complete four classes each semester, for a total of eight courses per year (Edwards, 1995). With the eight-block alternating-day model, students receive instruction in one-half of their courses on rotating days and continue in these courses throughout the academic year. For example, a student would enroll in classes 1-4 and 5-8 in an alternating-day arrangement (Hackmann, 1995a). Minor variations of the 4x4 and eight-block alternating day models from their "pure" form also exist, but the above descriptions represent the most common derivations. It is estimated that approximately 30% of secondary schools in the United States

now utilize some form of block scheduling (Rettig & Canady, 1999), although the implementation levels vary greatly among regions of the nation.

Block scheduling proponents assert that daily-period models reinforce behaviorist teaching models that relegate students to being passive participants in teacher-dominated classrooms. In contrast, block scheduling is advanced as a method to involve students in learning, with teachers as facilitators. Such catch phrases as "teacher as coach" and "less is more" are frequently voiced as reasons for considering block formats. For example, in 1996 the National Association of Secondary School Principals (NASSP) recommended that high schools realign their instructional practices to promote active student engagement, emphasize depth over surface treatment of content, build real-world connections, and help students develop problem-solving skills—all strategies that are consistent with constructivist theory. Extended blocks also afford an opportunity for enhanced teacher-student interaction, thus promoting a more relaxed and supportive school climate (Buckman, King, & Ryan, 1995; Hackmann, 1995a; NASSP, 1996).

The opposing viewpoint is that focusing on depth of understanding necessitates the exclusion of important content, which will likely cause student achievement to suffer. Additional concerns include the potential for over-reliance on lectures for teachers who do not adopt learner-centered methodologies, problems for transferring students, gaps in retention, and students' difficulties in quickly mastering content after absences (Hackmann, 1995a; Northeast and Islands Regional Education Laboratory, 1998).

Block Scheduling Research

An extensive body of literature related to the effectiveness of secondary scheduling models is in existence, and the number of publications has increased dramatically in the past

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10 years. However, in spite of this recent attention, most reports tend to be anecdotal, consisting of individual school case studies and focused primarily on climate variables. Only a few studies have empirically investigated the relationship between scheduling types and student achievement, in order to determine the models' effectiveness in facilitating improved student learning. The literature can be classified into three broad types: a) summaries of teacher and student perceptions of block scheduling (e.g., Shortt & Thayer, 1998; Wilson, 1995), b) theoretical and descriptive reports (e.g., Bowman, 1998; Howard, 1998; Schroth & Dixon, 1996), and c) empirically based studies (e.g., Bateson, 1990; Cheng, Dhanota, & Wright, 1981). Additionally, a number of publications address implementation issues when transitioning to block models (e.g., Dougherty, 1998; Hackmann, 1995b).

A number of empirical studies have assessed criteria related to attitudinal and climate changes as a result of scheduling reforms. Surveys of teachers and students typically disclose that blocks assist in improving building climate variables, including teacher morale, student satisfaction with school, and the quality of teacher-student interaction (Buckman et al., 1995; Hackmann, 1995a; Wilson, 1995). Additional positive student outcomes include significant decreases in disciplinary referrals (Buckman et al., 1995; Hackmann, 1995a, O'Neil, 1995; Shortt & Thayer, 1998), and improved student attendance (Buckman et al., 1995; Hackmann, 1995a).

Although improved academic achievement is often cited as a primary goal for scheduling reforms, the proposed effectiveness of block scheduling does not rest on a well-defined research base (Bowman, 1998). Several studies have suggested that students' course grades may improve marginally under a block format (Buckman et al., 1995; Edwards, 1995; Stumpf, 1995), but the subjective nature of grades and teachers' grading practices does not

permit obtaining conclusive evidence of improved academic achievement. Other studies have determined that increased numbers of students complete Advanced Placement (AP) courses when schools transition to the block schedule (Edwards, 1995).

Improvement in student grades and an increase in advanced course enrollments would lead one to hypothesize that an increase in academic achievement would also occur, as measured by student performance on standardized test scores. However, the findings in this arena have been inconsistent and contradictory. Although the research in general suggests that a block format does not negatively affect standardized test scores (Black, 1998; Schroth & Dixon, 1996), only a limited number of studies have determined a direct improvement in test scores (Bateson, 1990; Shortt & Thayer, 1998; Veal & Schreiber, 1999). The College Board investigated the relationship between block scheduling models and student performance on AP examinations, finding that students enrolled in blocked courses earned lower scores on AP examinations, when compared with students enrolled in traditional year-long courses (Wronkovich, 1998).

Some high school faculties have been reticent to consider changing their scheduling models, in view of the limited and inconclusive data related to student achievement and high school organizational structures. The need exists to conduct large-scale studies, beyond case studies of individual schools, that examine the interrelationships between scheduling types and standardized test scores. Are there significant differences in student achievement among block-scheduled schools and those with traditional daily-period schedules?

Current Study

The current study examines the relationship between scheduling format and average composite scores on the ACT Assessment, after controlling for lifestyle factors, gender,

state, school enrollment levels, number of examinees, and years under scheduling model. Based upon the inconsistent and limited research conducted to date, no specific hypotheses can be ascertained. The benefits of using a standardized metric, such as the ACT Assessment, is that it is not as susceptible to the potential for grade inflation and subjective biases in grading procedures that may occur when utilizing less standardized measures. In addition, a standardized metric allows for more meaningful comparisons across schools.

Method

Participants

The participants were 38,089 high school seniors in 568 public high schools from the states of Illinois and Iowa who completed the ACT Assessment during 1999. The use of data from these two states was appropriate for this study, since approximately 27% of Iowa and Illinois secondary schools utilize block scheduling (Hackmann, in press), which is in close alignment with Rettig and Canady's 1999 estimate. In addition, these states have high percentages of students completing the ACT Assessment, with 67% of Illinois' and 66% of Iowa's graduating seniors participating in this test.

Measures

ACT Assessment. Rather than examine individual student ACT scores, this study focused on data at the school level. As such, individual schools were represented by mean ACT composite scores based on the examinees at the specific school. The ACT Assessment composite consists of four topic areas: mathematics, English, reading, and science reasoning.

School Information. Data were collected regarding scheduling types for the entire population of public high schools in the two states. Only three scheduling models were considered for the current study: traditional eight-period, eight-block alternating-day, and

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4x4 semester. Within these two states, the eight-period model is the most commonly utilized daily-period scheduling format, and the eight-block alternating-day and 4x4 semester plans represent the most commonly employed blocked models. Furthermore, in each of these models, students had an equal opportunity to complete eight courses over the duration of one academic year. The selection of these scheduling types provided the best means of controlling for allocated instructional time, since the equivalent of 1/8 of the instructional day would be devoted to each course within all three models. Schools that used hybrid models or variations on these scheduling types were excluded in the analyses.

After accounting for these sources of potential confounding, this study utilized data from 351 high schools using a traditional eight-period schedule, 161 schools using an eight-period alternating-day model, and 56 schools using a 4x4-semester model. For data analysis, the state (either Illinois or Iowa) was indicated, as well as the proportion of females and number of examinees in each school completing the ACT Assessment.

Market Data Retrieval System (MDRS). Factors that have been shown to be related to educational achievement were examined as potential control variables. Information at the individual level (e.g., race, gender) and the school level (e.g., school size) have previously demonstrated relationships to ACT Assessment scores (Noble, Davenport, Schiel, & Pommerich, 1999a, 1999b). As such, potential control variables were identified in the current study. First, information on school size was obtained from MDRS. Lifestyle factors such as socioeconomic status, parental educational level, geographic area, and neighborhood ethnic mix were also considered as control variables. While the data was available to assess some of these variables separately, based on relationships, PRIZM, a geodemographic database, also called a lifestyle segmentation system, was employed in the current study (Claritas, 2000).

PRIZM clusters neighborhoods based on demographic and lifestyle indicators, using some of the following data: U.S. Census information, social rank, mobility, urbanization, household composition, ethnicity, and housing. There are 62 clusters grouped into 15 broader social groups, and 14 of these groups were identified for the study.

Selection of Control Variables

When the data were examined at the PRIZM category level, some categories had a small sample size, which could potentially bias the results of the study. Therefore, prior to utilizing PRIZM data, correlations were conducted between the categories and the MDRS database (e.g., degree of urbanization) to determine whether collapsing some PRIZM categories might be permissible. Since the relationships within PRIZM categories and relationships of PRIZM categories to MDRS variables were small, collapsing across categories was not a feasible option.

Results

School Level Descriptive Statistics

Semi-continuous variables (e.g., percentage of females) were organized into category levels for descriptive purposes. In order to dichotomously code the proportion of females in the sample, a median split was used. This process also was used for the number of examinees within each school, with the first group being those schools with less than 30 examinees and the second group with 30 or more examinees. School size was trichotomized based on the frequency distributions. Other variables were dummy coded: the PRIZM categories, state, and scheduling type.

The overall mean for the ACT Assessment composite score was m=21.244, sd=1.74. As noted in Table 1, descriptive statistics for ACT composite scores were calculated across each of the independent variables.

Insert Table 1 about here

ACT composite scores equaled 21.28 for eight-period schedule, 21.13 for eight-block alternating-day model, and 21.36 for 4x4 semester plan. From a descriptive perspective, the differences between schedule types on the composite scores were negligible. This lack of difference appears to be consistent for the following variables: state, proportion female, school enrollment, number of school examinees, and number of years of scheduling model.

Descriptive data on ACT composite scores by schedule type and individual control variables was then analyzed. (See Table 2.) When examining the difference between scheduling type by state, Illinois had slightly lower mean scores and slightly higher standard deviations across all three scheduling types.

Insert Table 2 about here

Within a state, the differences between scheduling types were negligible. Distinctions based on PRIZM by scheduling type were more difficult to determine, due to small sample sizes within some categories. By scheduling type, the greatest differences existed between Second City Centers on eight-period (m=22.84) and eight-block alternating-day (m=19.77). Another difference was between Urban Midscale on eight-period (m=16.70) and eight-block

alternating-day (m=14.82). Other differences between scheduling type on specific PRIZM codes were negligible.

Small cell sizes made statistical comparisons unfeasible. Moreover, a definite pattern did not emerge. Comparing PRIZM by scheduling type discloses that the lowest scores were with Urban Midscale and Urban Cores, ranging from m=14.82 to m=16.70. These findings suggest that PRIZM categories have a strong relationship with ACT Assessment composite scores, furthering support for the use of this variable as a control variable for regression analyses. These findings were not unanticipated, given the research suggesting that standardized test scores frequently reflect students' socioeconomic status (Battistich, Solomon, Kim, Watson, & Schaps, 1995; English & Larson, 1996).

In the planning of this study, there was no expectation of differential performance of schools as a function of gender percentages within respective schools. For sake of completeness, however, the percentage of females enrolled in an institution (indicated as less than or equal to the median (45.16%) or greater than the median) was included in the analysis. As Table 2 suggests, schools implementing some form of block scheduling differed by no more than 0.12 ACT composite score points between schools above and below the "percent female" median. Schools with a traditional eight-period schedule had a larger discrepancy (0.51 points). Caution is warranted in interpreting these differences, however, as they are unadjusted for other important variables. Other research suggests that "differential performance on the ACT Assessment results from academic preparation, regardless of ethnicity or gender" (ACT, 1997, p. 44).

It seems reasonable to expect that composite score means should be more stable and should demonstrate less variance with larger school enrollments. However, the opposite

occurred: When school size was conditioned on schedule type, large schools displayed more composite score variance than did medium- and small-sized schools. However, since school size was treated as ordinal for descriptive purposes, a meaningful relationship may have been hidden.

The number of examinees was split into two categories: fewer than 30 students and 30 or more students. ACT, Inc. reports aggregated information only to schools with 30 or more students completing the examination, since the results are not as stable in the former group. Descriptive statistics show that, by scheduling type, none of the means differed by more than one point. Further, the variability across all three types was larger for more examinees. This finding contradicted expectations but was consistent with the pattern for schedule type and school enrollment size. (See Table 2.) Thus, this variable was used in the regression analysis.

Some studies have suggested that, when a scheduling change is made, positive changes cannot occur until at least the fourth year (Wronkovich, Hess, & Robinson, 1997). Descriptive data demonstrated that schools using the eight-block alternating-day and 4x4 block schedules for four or more years did display a tendency to have higher scores when compared with their counterparts with fewer than four years on the block schedule. However, the differences were slight.

Correlations were calculated on the study variables to assess relationship strength and supplement collinearity diagnostics. (See Table 3.)

Insert Table 3 about here

Due to sample size, most correlations were statistically significant, but only a few demonstrated relationships $\geq |.20|$. A strong relationship existed (r_{xy}=-.40) between State and the PRIZM group Heartlanders, suggesting that more Heartlanders reside in the state of Iowa. Elite suburbs were positively correlated with school size, and the relationship between State and more than four years on eight-block schedules was positive (r_{xy}=.24), suggesting that more Illinois schools have utilized eight-block alternating-day scheduling for more years than Iowa schools. A comparison of composite scores to predictor variables shows only three standing out: elite suburbs (r_{xy}=.20), urban uptown (r_{xy}=-.29), and urban cores (r_{xy}=-.46). This suggests that elite suburbs are positively related to ACT Assessment composite scores. Urban uptown and urban cores, however, are negatively related to ACT Assessment composite, which is consistent with the information examined at the mean level. In general, it appears there is not a strong relationship between predictors and the ACT Assessment composite when examined at the individual variable level.

School Level Regression Analyses

Hierarchical regression analysis was conducted to evaluate whether schedule type accounted for a significant amount of variability in ACT composite scores above and beyond the control variables in the study. Diagnostic analyses were performed on the entire regression equation in order to confirm that basic statistical assumptions were met. In the diagnostic results, two areas surfaced as potential problems. First, two schools were determined to be outliers based on DFBETAs and DFFITs values (Pedhazur, 1997), and subsequently were excluded from further analyses. A second area of potential concern dealt with multi-collinearity. However, the only variables demonstrating unacceptable levels of

multi-collinearity were the PRIZM categories. As these were dummy coded indicators of a single qualitative variable entered as a block, they were retained in the regression model.

As suggested in Table 4, the control variables described earlier were entered in the first step of the analysis.

Insert Table 4 about here

These variables accounted for 45.39% of the variability in ACT Composite score means (R^2=.4539, Adjusted R^2=.4359). The study variable (schedule type) was entered following the entry of control variables. The full regression model accounted for 45.64% of the variable in ACT composite score means (R^2=.4564, Adjusted R^2=.4365). Comparing the full model to the model containing only the control variables yielded an R^2 change of .0025 (Adjusted R^2=.006). This result indicated that the addition of schedule type to a model already containing the control variables explained a meager additional 0.25% of the variability in ACT composite score means.

Discussion

This study represents the first phase of an ongoing study assessing the effectiveness of class scheduling models, by examining the relationship between schedule types and student achievement as measured by the ACT Assessment composite score. In general, the findings show that the scheduling type used within a school does not predict ACT composite scores when examined at the school level. This study is the first to investigate student performance on a standardized test by utilizing a large population of schools spanning district boundaries as well as state lines. The finding of "no difference" between

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schedule types does not necessarily mean that all scheduling types work equally well at all schools, as no two school are alike (Black, 1998).

The findings from this phase of the longitudinal study suggest that faculties who are considering changing scheduling approaches need to weigh various factors and consider scheduling alternatives carefully. If the scheduling type is modified with no accompanying changes in other facets of the school (e.g., professional development, consideration of differing needs of students), then the restructuring initiative will likely not be effective (Dougherty, 1998; Shortt & Thayer, 1995). A review of the literature, both anecdotal and empirical, suggests keys for successful block scheduling. These include, but are not limited to, the following: understanding the process of change, involving stakeholders, and providing professional development geared toward changing instructional methods (Hackmann 1995b).

Limitations and Future Research

Several limitations of the current study need to be recognized. As previously mentioned, no two schools are alike, and thus any statistical comparisons of schools must be interpreted with caution. Future research would benefit by analyzing data from the individual school level. For example, such strategies as involving faculty in researching proposed models, gaining the support of a critical mass of faculty for any scheduling change, engaging in sufficient pre-implementation training, and/or providing sufficient time for lesson planning and preparation could affect the success of the scheduling reform.

Another limitation was that data were aggregated to the school level by taking an arithmetic composite mean of all examinees in the school. As such, observations were based on various sizes, which potentially could result in biased estimates. Future research would

benefit by examining the influence of unequal numbers of examinees contributing to aggregate scores on standardized test scores.

A third limitation was that all the schools examined in this study were located in two states in the Midwestern region of the United States, consisting largely of rural schools. Future research would benefit from including additional states to increase the diversity of schools in the study. This sample was fairly homogenous with regard to race/ethnicity, with the majority of the examinees from the Caucasian race. Due to this factor, race/ethnicity was not used in the present study.

It has been posited that secondary faculties may need several years of instructional experimentation and practice before any academic improvements facilitated by a scheduling change can be realized (Wronkovich et al., 1997). This observation parallels findings related to the effectiveness of employee involvement on organizational performance (Denison, 1990). In the current study, there is not a sufficient baseline from which to assess the effectiveness of scheduling for individual schools, given the fact that block-of-time scheduling is only recently beginning to take hold in Illinois and Iowa secondary schools (Hackmann, in press). Although alternating-day models have existed in Illinois since 1987 and Iowa since 1990, 4x4 semester models were first implemented in Illinois in 1994 and one year later in Iowa. The ongoing study is utilizing a longitudinal design, so that achievement levels of individual schools can be compared over time.

Conclusion

The current study adds to the limited knowledge base regarding "what we know" about scheduling models and their relationship to student performance. The study suggests that the block scheduling restructuring initiative may not be the panacea that some advocates

believe it to be. Since scheduling models do not exist in a vacuum, the mere adoption of a new scheduling approach—absent the concurrent implementation of additional reforms—likely will have a marginal effect, if any, on student achievement. Scheduling reforms are interrelated with other organizational components that promote teaching and learning, such as a commitment to constructivist practices and the informed selection of instructional methods that reflect a learner-centered approach to instruction. Simply stated, a scheduling change, in and of itself, is not enough.

It is possible that the planned and deliberate adoption of a scheduling model, when implemented in combination with other instructional and organizational changes, may result in improved student achievement over time for specific schools, and perhaps for specific individuals within schools. The ongoing longitudinal study will continue to explore this issue and, hopefully, will provide additional illumination into this topic.

References

ACT, Inc. (1997). *ACT Assessment technical manual.* Iowa City, IA: Author.

Bateson, D. J. (1990). Science achievement in semester and all-year courses. *Journal of Research and Science Teaching, 27*, 233-240.

Battistich, V., Solomon, D. Kim, D., Watson, K. M., & Schaps, E. (1995). Schools as communities, poverty levels of student populations, and students' attitudes, motives, and performance: A multilevel analysis. *American Educational Research Journal, 32*, 627-658.

Black, S. (1998). Learning on the block. *American School Board Journal, 185*(1), 32-34.

Bowman, R. F. (1998). If block scheduling is the answer, what is the question? *The Clearing House, 71*, 242-244.

Buckman, D. C., King, B. B., & Ryan, S. (1995). Block scheduling: A means to improve school climate, *NASSP Bulletin, 79*(571), 9-18.

Cawelti, G. (1994). *High school restructuring: A national study.* Arlington, VA: Educational Research Service.

Cheng, M., Dhanota, A. S., & Wright, E. N. (1981). *A study of two types of scheduling arrangements for grade 9 students in Central High School of Commerce, 1980-1981.* Research Service #160. Toronto, Canada: The Board of Education for the City of Toronto.

Claritas, Inc. (2000). *PRIZM cluster narratives: Summary lifestyle descriptions.* San Diego, CA: Author.

Denison, D. R. (1990). Toward a theory of organizational culture and effectiveness. *Organization Science, 6*(2), 204-223.

Dougherty, B. (1998). *Policy briefing: Block scheduling in secondary schools.* PREL Briefing Paper. Honolulu, HI: Pacific Resources for Education and Learning. (ERIC Document Reproduction Service No. ED 415 587)

Edwards, C. M., Jr. (1995). The 4x4 plan. *Educational Leadership, 53*(3), 16-19.

Elmore, R. F. (1995). Teaching, learning, and school organization: Principles of practice and the regularities of schooling. *Educational Administration Quarterly, 31*, 355-374.

English, F. W., & Larson, R. L. (1996). *Curriculum management for educational and social science organizations* (2nd ed.). Springfield, IL: Charles C. Thomas.

Glatthorn, A. A. (1995). *Content of the curriculum* (2nd ed.). Alexandria, VA: Association for Supervision and Curriculum Development.

Hackmann, D. G. (1995a). Improving the middle school climate: Alternating-day block schedule. *Schools in the Middle, 5*(1), 28-34.

Hackmann, D. G. (1995b). Ten guidelines for implementing block scheduling. *Educational Leadership, 53*(3), 24-27.

Hackmann, D. G. (in press). Secondary school scheduling trends: Tales of two Midwestern states. *Planning and Changing.*

Howard, E. (1998). The trouble with block. *American School Board Journal, 185*(1), 35-36.

National Association of Secondary School Principals. (1996). *Breaking ranks: Changing an American institution.* Reston, VA: Author.

National Commission on Excellence in Education. (1983). *A nation at risk: The imperative for educational reform.* Washington, DC: Author.

National Education Commission on Time and Learning. (1994). *Prisoners of time.* Washington, DC: Author.

Noble, J., Davenport, M., Schiel, J., & Pommerich. M. (1999a). High school academic and noncognitive variables related to the ACT scores of racial/ethnic and gender groups. *ACT Research Report Series, 99-6.*

Noble, J., Davenport, M., Schiel, J., & Pommerich. M. (1999b). Relationships between noncognitive characteristics, high school course work and grades, and test scores of ACT-tested students. *ACT Research Report Series, 99-4.*

Northeast and Islands Regional Education Laboratory. (1998). *Block scheduling: Innovations with time. Themes in education series.* Providence, RI: Office of Educational Research and Improvement, Brown University.

O'Neil, J. (1995). Finding time to learn. *Educational Leadership, 53*(3), 11-15.

Pedhazur, E. J. (1997). *Multiple regression in behavioral research: Explanation and prediction* (3rd ed.). Fort Worth, TX : Harcourt Brace.

Rettig, M. D., & Canady, R. L. (1999). The effects of block scheduling. *The School Administrator, 56*(3), 14-16,18-20.

Schroth, G., & Dixon, J. (1996). The effects of block scheduling on student performance. *International Journal of Educational Reform, 5*, 472-476.

Shortt, T. L., & Thayer, Y. V. (1995). What can we expect to see in the next generation of block scheduling? *NASSP Bulletin, 79*(571), 53-62).

Shortt, T. L., & Thayer, Y. V. (1998). Block scheduling can enhance school climate. *Educational Leadership, 56*(4), 76-84.

Stumpf, T. (1995). A Colorado school's un-rocky road to trimesters. *Educational Leadership, 53*(3), 20-22.

Veal, W. R., & Schreiber, J. (1999). Block scheduling effects on a state mandated test of basic skills. *Education Policy Analysis Archives, 7*(29). Available Internet: http://epaa/asu/epaa.htm

Wilson, C. (1995). The 4:4 block system: A workable alternative. *NASSP Bulletin, 79*(571), 63-65.

Wronkovich, M. (1998). Block scheduling: Real reform or another flawed educational fad? *American Secondary Education, 26*(4), 1-6.

Wronkovich, M., Hess, C.A., & Robinson, J. E. (1997). An objective look at math outcomes based on new research into block scheduling. *NASSP Bulletin, 81*(593), 32-41.

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Table 1

Descriptive Statistics for ACT Composite Scores for Levels of Independent Variables

Variable	N	Mean	Standard Deviation	Variance	Minimum	Maximum
Schedule Type						
Eight-period	351	21.28	1.94	3.78	13.96	30.00
Eight-Block Alternating	161	21.13	1.41	2.00	14.66	24.89
4x4 Semester	56	21.36	1.09	1.19	17.66	23.42
State						
Illinois	308	20.98	2.06	4.24	13.96	30.00
Iowa	260	21.55	1.18	1.40	18.18	24.55
Lifestyle Indicator						
Second City Society	7	22.00	1.03	1.06	20.32	23.30
Second City Centers	16	22.00	2.72	7.38	18.68	30.00
Country Families	139	21.58	1.11	1.23	18.38	24.43
Heartlanders	196	21.36	1.31	1.71	18.18	24.80
Rustic Living	105	20.92	1.21	1.47	17.32	23.66
Elite Suburbs	20	23.30	1.36	1.86	20.37	24.99
The Affluentials	8	21.67	1.42	2.00	19.04	23.41
Inner Suburbs	8	19.33	2.81	7.92	15.05	24.03
Landed Gentry	12	22.35	1.03	1.06	21.28	24.80
Exurban Blues	12	21.96	0.94	0.89	20.28	24.28
Working Towns	19	21.51	0.85	0.72	19.94	23.04
Urban Uptown	10	19.59	2.87	8.27	15.62	22.91
Urban Midscale	6	16.41	2.27	5.17	14.94	20.89
Urban Cores	9	14.89	0.93	0.86	13.96	16.93
Proportion Female						
At or below median	286	21.10	1.79	3.20	14.00	24.55
Above median	282	21.40	1.68	2.82	13.96	30.00
School Enrollment						
Bottom 1/3	189	21.13	1.46	2.12	16.00	24.55
Middle 1/3	190	21.44	1.28	1.65	18.18	30.00
Top 1/3	189	21.17	2.29	5.26	13.96	24.99
Number of Examinees						
Fewer than 30	217	21.11	1.51	2.28	16.00	24.80
30 or more	351	21.33	1.87	3.47	13.96	30.00
Years Implemented						
1	25	21.01	1.80	3.23	14.94	24.89
2	25	21.11	1.32	1.73	18.38	23.52
3	42	21.21	1.45	2.11	14.98	23.08
4	50	21.43	0.92	0.85	19.04	23.42
5	31	21.58	1.05	1.10	19.71	23.92
6	34	20.64	1.56	2.45	14.66	22.77
7	9	20.95	0.67	0.45	19.86	21.67
10	1	23.18				
More than 10	351	21.28	1.94	3.78	13.96	30.00
Alternating-Day<4 years	56	20.96	1.69	2.85	14.94	24.89
Alternating-Day≥4 years	105	21.21	1.24	1.55	14.66	23.92
4x4 Semester < 4 years	36	21.38	1.14	1.30	17.66	23.07
4x4 Semester ≥ 4 years	20	21.32	1.03	1.06	19.41	23.42

Table 2

Descriptive Statistics of ACT Assessment Composite for Levels of Control Variables by Schedule Type

Variable	Eight-period			8-block alternating			4x4 semester		
	N	Mean	SD	N	Mean	SD	N	Mean	SD
State									
Illinois	168	20.96	2.44	113	20.97	1.53	27	21.19	1.25
Iowa	183	21.57	1.27	48	21.49	1.00	29	21.52	0.92
PRIZM Group									
Second City Society	4	22.50	0.86				3	21.34	0.98
Second City Centers	11	22.84	2.84	4	19.77	0.87	1	21.65	.
Country Families	67	21.80	1.12	55	21.30	1.11	17	21.57	0.89
Heartlanders	139	21.39	1.40	49	21.29	1.04	8	21.32	1.27
Rustic Living	63	20.80	1.30	32	21.14	1.15	10	21.02	0.74
Elite Suburbs	16	22.99	1.42	1	24.89	.	3	22.65	0.81
The Affluentials	5	21.66	0.90	1	19.04	.	2	23.00	0.59
Inner Suburbs	4	18.75	3.91	1	20.54	.	3	19.70	1.79
Landed Gentry	7	22.74	1.10	3	22.16	0.73	2	21.32	0.05
Exurban Blues	6	22.35	1.02	5	21.39	0.66	1	22.50	.
Working Towns	9	21.82	0.91	6	21.18	0.93	4	21.29	0.32
Urban Uptown	8	19.32	3.17	1	21.42	.	1	19.90	.
Urban Midscale	5	16.70	2.41	2	14.82	0.23			
Urban Cores	7	14.91	1.07	2	14.82	0.23			
Unclassified	1	19.85	.						
School Size									
Small	128	21.12	1.53	54	21.22	1.33	7	20.58	0.86
Medium	113	21.57	1.47	67	21.25	0.93	10	21.16	0.95
Large	110	21.17	2.66	40	20.78	2.04	39	21.55	1.11
Number of Examinees									
Fewer than 30	153	21.15	1.58	55	21.06	1.37	9	20.79	1.02
30 or more	198	21.38	2.18	106	21.16	1.44	47	21.47	1.08
Years on Schedule									
Fewer than four				56	20.97	1.69	36	21.32	1.03
Four or more				105	21.21	1.24	20	21.38	1.14
Percent Female									
≤ Overall Median (45.16%)	172	21.02	2.01	89	21.18	1.44	25	21.30	1.23
> Overall Median (45.16%)	179	21.53	1.85	72	21.06	1.39	31	21.41	0.99

Table 3

Correlations of Study Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1. State (IA-0, IL-1)	-																								
2. Second City Society	0.10	-																							
3. Second City Centers	0.07	-0.02	-																						
4. Country Families	0.09	-0.06	-0.10	-																					
5. Heartlanders	**-0.40**	-0.08	-0.12	**-0.41**	-																				
6. Rustic Living	0.05	-0.05	-0.08	**-0.27**	**-0.35**	-																			
7. Elite Suburbs	0.18	-0.02	-0.03	-0.11	-0.14	-0.09	-																		
8. The Affluentials	0.05	-0.01	-0.02	-0.07	-0.09	-0.06	-0.02	-																	
9. Inner Suburbs	0.05	-0.01	-0.02	-0.07	-0.09	-0.06	-0.02	-0.01	-																
10. Landed Gentry	0.11	-0.02	-0.03	-0.08	-0.11	-0.07	-0.03	-0.02	-0.02	-															
11. Exurban Blues	0.01	-0.02	-0.03	-0.08	-0.11	-0.07	-0.03	-0.02	-0.02	-0.02	-														
12. Working Towns	0.05	-0.02	-0.03	-0.11	-0.14	-0.09	-0.04	-0.02	-0.02	-0.03	-0.03	-													
13. Urban Uptown	0.12	-0.01	-0.02	-0.08	-0.10	-0.06	-0.03	-0.02	-0.02	-0.02	-0.02	-0.02	-												
14. Urban Midscale	0.09	-0.01	-0.02	-0.06	-0.08	-0.05	-0.02	-0.01	-0.01	-0.02	-0.02	-0.02	-0.01	-											
15. Urban Cores	0.12	-0.01	-0.02	-0.07	-0.09	-0.06	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.02	-0.01	-										
16. Proportion Female	0.02	-0.02	-0.02	-0.00	0.04	-0.02	-0.13	0.00	0.03	0.00	0.00	0.03	-0.03	0.10	0.04	-									
17. School Size	0.11	0.14	0.14	-0.04	**-0.37**	-0.10	**0.23**	0.15	0.15	0.18	0.12	0.12	0.13	0.13	0.16	-0.06	-								
18. ≥4 Years on 8-block	**0.24**	-0.05	-0.05	0.18	-0.06	0.01	-0.09	-0.02	-0.02	-0.01	0.02	-0.01	-0.06	-0.05	-0.02	0.06	-0.12	-							
19. <4 Years on 8-block	-0.00	-0.04	0.05	-0.02	-0.00	0.03	-0.03	-0.04	-0.04	-0.01	0.03	0.04	0.00	0.02	0.01	0.02	0.05	-0.16	-						
20. ≥4 Years on 4x4	-0.05	0.07	0.03	-0.04	-0.10	0.06	0.07	0.06	-0.02	0.04	-0.03	0.07	0.05	-0.02	-0.02	-0.06	0.09	-0.09	-0.06	-					
21. <4 Years on 4x4	-0.01	0.10	-0.04	0.09	-0.10	-0.05	-0.01	0.03	0.15	0.01	0.01	0.03	-0.03	-0.03	-0.03	-0.01	**0.21**	-0.12	-0.09	-0.05	-				
22. Eight-Period	-0.16	-0.01	0.02	-0.16	0.14	-0.02	0.07	0.00	-0.03	-0.01	-0.04	-0.06	0.05	0.05	0.04	-0.03	-0.08	**-0.61**	**-0.42**	**-0.24**	**-0.33**	-			
23. 8-Block Alternating	**0.20**	-0.07	-0.01	0.14	-0.05	0.02	-0.10	-0.04	-0.04	-0.01	0.04	0.01	-0.05	-0.03	-0.02	0.07	-0.07	**0.76**	**0.53**	-0.12	-0.16	**-0.80**	-		
24. 4x4 Semester	-0.04	0.12	-0.02	0.05	-0.14	-0.01	0.03	0.06	0.11	0.03	-0.01	0.07	0.00	-0.03	-0.04	-0.05	**0.23**	-0.16	-0.11	**0.58**	**0.79**	**-0.42**	**-0.21**	-	
25. ACT Composite	-0.16	0.05	0.07	0.11	0.05	-0.09	**0.20**	0.03	-0.13	0.09	0.06	0.03	-0.13	**-0.29**	**-0.46**	-0.09	0.01	-0.01	-0.05	0.01	0.02	0.03	-0.04	0.02	-

Note: Most correlations are significant due to the large sample size. Correlations ≥|.20| are bold.

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Table 4

Statistics from Regression Analysis

Regression Stage	Standardized Regression Coefficient	R^2	Adj-R^2	ΔR^2	ΔAdjR^2
Step 1: Control Variables		.4539	.4359		
State (Illinois/Iowa)	-.14				
PRIZM					
Second City Centers	-.03				
Country Families	-.04				
Heartlanders	-.13				
Rustic Living	-.18				
Elite Suburbs	.13				
The Affluentials	-.02				
Inner Suburbs	-.18				
Landed Gentry	.05				
Exurban Blues	.01				
Working Towns	-.03				
Urban Uptown	-.16				
Urban Midscale	-.34				
Urban Cores	-.51				
Proportion Female	.00				
School Size	.10				
Alternating-Day $\geq$ 4 years	-.01				
4x4 Semester $\geq$ 4 years	-.03				
Step 2: Enter Schedule Type				.002	.001
Alternating-Day	-.07				
4x4 Semester	-.04				
Total Equation		.4564	.4365		